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Forest Service

**Northeastern
Area**

National Wood In Transportation Program

'98 NA
STATUS REPORT

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The Wood In Transportation Program

Fiscal Year 1998 Status Report

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Yellowstone County, Montana — Timber Bridge Commercialization Project

Yellowstone County, Montana, is 2,666 square miles of Montana ranch country, bisected by the Yellowstone River. The arid climate of the area, coupled with harsh winters and alkali soil, makes it an ideal location for treated timber bridges.

In 1996, the county received a grant from the Wood In Transportation Program to partially fund three, 40-feet-long by 28-feet-wide timber bridges. The project goals were to construct economical timber bridges and to encourage involvement by a local glue-laminated fabricator.

The bridges were competitively bid in the spring of 1997 and constructed during the summer and fall. The bridges have treated timber pilings, reinforced concrete caps, glue-laminated beams, backwalls, wingwalls, deck, and curb. The railing systems of these bridges are treated timber posts with glue-laminated rails, faced with galvanized steel W-beams.

The final construction cost of each of the three bridges was about $87,500 (including all engineering and survey costs), with a superstructure cost of just under $46.00 per square foot. The heaviest single element in these bridges weighed less than 3,000 pounds – an important construction consideration at remote construction sites.

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Indiana Portable Timber Bridge Demonstration

In fiscal year 1997, the Indiana Hardwood Lumberman's Association (IHLA), in conjunction with the Indiana Sustainable Forestry Initiative Committee, received special project funding to demonstrate the benefits of using portable timber bridges for crossing streams during harvesting operations. During September 1997, a field demonstration was held in Morgan-Monroe State Forest. It was attended by more than 40 individuals including loggers, foresters, and private landowners. Participants were able to view the installation of a portable bridge over a small stream, pose questions to state/federal/university/industry experts, and evaluate the options of purchasing a similar bridge or leasing the demonstration bridge from the IHLA. As a follow-up to the demonstration, the Indiana Division of Forestry successfully used the portable bridge on a commercial State Forest timber sale. The long-term objectives of the portable timber bridge project are to promote Best Management Practices, increase productivity in harvesting operations, improve water quality, and promote increased usage of timber structures across the state.

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National Wood In Transportation Program

An Overview of The Wood In Transportation Program

Modern timber bridges combine today's technology with a renewable American resource. Advances in wood preservation and the design of wooden structures make the modern timber bridge an economical, safe, and attractive alternative for bridge construction in many situations. To date, the Wood In Transportation (WIT) Program has funded 322 modern timber bridge projects, 195 of which are complete. The WIT Program has also funded 90 special projects, 54 of which are complete. Many of these special projects are focused on broadening the former National Timber Bridge Initiative into other WIT applications. In Fiscal Year 1996, the WIT Program developed guidelines for commercialization projects. The goal of these projects is to fully commercialize technology that has been successfully developed and demonstrated for transportation-related structures. WIT projects have assisted in improving the Nation's transportation system and revitalizing local economies. In Fiscal Year 1998, WIT's primary focus is on the commercialization of proven technology developed during the last nine years of the Program.

Increasing interest in wood-in-transportation structures, combined with a growing demand for technical information, indicates there is a real desire for the services provided by the Program. As WIT technology moves into the future, the USDA Forest Service will continue to provide reliable leadership and direction in the sustainable use of our Nation's forest resources for transportation purposes well into the 21st century.

Table 1. *Fiscal Year 1998 Wood In Transportation Program Projects Funded.*

Type	Number	Federal Contribution	Cooperative Contribution
Vehicular/Pedestrian	1	$14,250	$ 14,250
Special Projects	3	73,000	73,000
Commercialization	3	285,750	655,410
Other	1	45,000	
Total	8	$418,000	$ 742,660

Table 2. *Completed Wood In Transportation Projects.*

Region	Vehicular	Pedestrian	Special Projects	Commercialization Projects	Total
Northeastern	82	8	31	0	121
Southern	41	6	16	0	63
Western	51	7	7	1	66
Total	174	21	54	1	250

The Wood In Transportation Program
Fiscal Year 1998

Introduction

A significant opportunity exists in the United States to improve local transportation networks and revitalize local economies by using wood for bridges and other transportation structures. Approximately 32 percent of the 575,000 highway bridges across the Nation are in need of repair or replacement, consequently causing a severe burden on the economy.

Modern timber bridge technology provides an opportunity to rebuild this crumbling infrastructure. Many bridges, particularly those on double-lane, rural roads, are ideally suited for replacement with wood. Improvements in wood treatment, engineered wood composite products, and bridge designs provide for the increased use of wood as a construction material to assist in the cost-effective rebuilding of our Nation's infrastructure.

To address this opportunity, the United States Congress funded the Wood In Transportation (WIT) Program, formerly known as the National Timber Bridge Initiative, beginning in Fiscal Year 1989. The purpose of this Status Report is to describe the WIT Program and its accomplishments to date.

Program Direction

During the first five years of the WIT Program, the focus primarily was on vehicular bridges for highway use. However, because of increased interest and demand, the Program has broadened into other market niches, such as pedestrian and trail structures, portable bridges for temporary access, and railway structures. The WIT Program is also advancing into other products, such as retaining walls, box culverts, sound barriers, highway signs, and marine structures. The primary direction of the WIT Program is to diversify local economies by the following means:

- **Improving local transportation networks, thus improving community vitality,**
- **Expanding the range of markets for wood products,**
- **Creating service industries for wood-in-transportation structures,**
- **Commercializing modern timber bridge technology,**
- **Utilizing community resources, i.e., local timber and local labor, and**
- **Improving America's forests through stewardship.**

Program components

The WIT Program's goals and objectives are being achieved through four distinct, yet interrelated components.

- **Demonstration Wood In Transportation Projects**
- **Research**
- **Technology Transfer and Information Management**
- **Rural Revitalization**

Demonstration Projects

Timber Bridges — Demonstration timber bridges show people how wood and new technology provide alternatives to traditional bridge construction techniques and materials. Some bridges are constructed using local labor and local timber resources, thus stimulating the area's economy. Using local timber also improves the health of our forests by developing a use for low-valued wood. Many of the demonstration timber bridges are cost-competitive with other bridge materials primarily because of the following three factors:

- **Lower costs for material and construction**
- **Lower maintenance costs**
- **Lower life-cycle costs**

As of February 1997, 195 timber vehicular and pedestrian bridge projects have been completed with WIT assistance. The Program has funded a variety of timber bridge designs. One design consists of placing timbers on edge and holding them together by running threaded steel rods from one side to the other. Another type of design utilizes lumber glued together. Demonstration timber bridges have been constructed of hardwoods, softwoods, and a combination of wood and other materials.

Special Projects — The WIT Program began formally sponsoring special projects in 1992. Special projects demonstrate new technologies or methods for reducing transportation system costs. They also study markets or perceptions related to timber uses in transportation structures. Special projects enable cooperators to initiate endeavors or implement strategies that will stimulate local, regional, or national economies.

Special projects also provide an avenue for the WIT Program to broaden into other wood-in-transportation applications, such as timber binwalls, portable bridges for temporary access, and railroad infrastructure. Since 1989, 90 special projects have been funded. Copies of special project summaries funded from 1989 to 1997 are available from the National Wood In Transportation Information Center. (See page 3.)

Commercialization Projects — In fiscal year 1998, the WIT demonstration project's focus is on commercialization projects. The WIT Program began funding commercialization projects in 1996, and since then has funded projects in Montana, Florida, Iowa, and Pennsylvania. A commercialization project is a cooperative project in which the Forest Service shares the cost with partners willing to share the benefits and commercial opportunities with others. These partners work closely with USDA Forest Service personnel to ensure that structurally adequate and economical wooden structures are built in a way that maintains strict quality control and provides a means to monitor the performance of the structure. The intended outcome of these projects is develop structures that showcase wood-in-transportation technology and provide useful design and cost information for potential users in other parts of the nation. These projects build upon past knowledge gained from research and other demonstration projects. An example of a commercialization project is the construction of four bridges using the same basic design that preferably uses local timber resources in a single-county or multi-county area.

In fiscal year 1998, the USDA Forest Service awarded $285,750 for three commercialization projects. One of these projects will result in five cost-effective, southern pine, stress-laminated timber bridges. The second project will result in ten portable timber bridges being built and then used for timber harvesting operations. The third project will result in construction of four white spruce, stress-laminated timber bridges. All of these projects build upon the knowledge acquired from past research and demonstration projects (see Table 3.)

Table 3. *Commercialization Wood In Transportation Projects.*

State and County	Federal Contribution	Cooperator Contribution	Fiscal Year	Planned Project Outcomes
Ohio — Richland	$100,000	$424,540	1998	5 vehicular timber bridges
Alaska — Mat-Su	$100,000	$128,745	1998	4 vehicular timber bridges
West Virginia — Monongalia	$85,750	$102,125	1998	10 pedestrian timber bridges
Pennsylvania — Centre	$40,000	$65,650	1997	1 pedestrian timber bridge & standard designs publication
Iowa — Ida	$124,500	$124,500	1997	5 vehicular timber bridges
Florida — Bay	$50,000	$93,606	1997	1 vehicular timber bridge
Montana — Yellowstone	$100,000	$341,600	1996	3 vehicular timber bridges

Research

The use of wood as a construction material is being researched to optimize the balance between existing and constantly developing technology. The goal is to ensure that current and future design and construction methods receive the optimum benefit of newly developed technology. Major research activities are based on the six-year needs assessment initiated in 1992 by the USDA Forest Service's Forest Products Laboratory (FPL) at Madison, Wisconsin, and the Federal Highway Administration (FHwA). The study identified more than 200 research needs. Some of the more important needs were to: 1.) develop crash-tested bridge rails for longitudinal and transverse timber decks, 2.) prepare guidelines and standard design details for designing modern timber bridges for minimum maintenance and long life, 3.) develop economical, easy-to-use equipment and methods to conduct nondestructive testing of in-place timber bridge components, including piles, and 4.) evaluate new wood preservatives.

The research effort is cooperative in nature. At the core of the research effort are the FPL and the FHwA. Their collaborators include West Virginia University, the University of Nebraska, Iowa State University, Oregon State University, Auburn University, and other universities throughout the country.

The WIT Program is providing an opportunity for universities to design and develop new timber bridge systems. This research effort has prompted provisional adoption of stress-deck design criteria by the American Association of State Highway and Transportation Officials (AASHTO). Adoption of these design criteria has provided uniform standards for slab deck designs across the country. Monitoring the performance of selected demonstration bridges and bridges on National Forest System land is necessary to develop and further refine economical, structurally-sound designs that will ultimately meet the approval of AASHTO. Monitoring activities typically include a two-year assessment of wood moisture content and bar stress levels, one or more load test(s), and intense visual inspection. Bridge monitoring is currently in progress on many demonstration bridge projects throughout the country to assess field performance of various designs. All of these activities provide information that helps improve design procedures, fabrication, construction, and erection methodologies.

Technology Transfer and Information Management

It is essential that the WIT Program be accessible to the public, including highway officials, bridge engineers, and community decisionmakers. For this Program to be successful, information about uses of wood-in-transportation applications must be transferred and distributed to others. The National Wood In Transportation Information Center, located in Morgantown, West Virginia, helps administer the WIT Program. The Center also identifies emerging technologies and stores, retrieves, and disseminates information to meet the needs of managers, planners, designers, builders, engineers, and others.

Besides overall program management, there are several primary activities occurring at the Center.

- **Administration of the demonstration grant program**
- **Facilitation of technology transfer**
- **Technical assistance**
- **Coordination of conferences, workshops, and seminars**
- **Information distribution**
- **Coordination with field coordinators**

As part of the technology transfer effort, the Information Center has created a website at *http://wit.fsl.wvnet.edu*. This site contains valuable information about the Forest Service WIT Program, available publications, grant opportunities, WIT events, WIT links, and WIT Coordinators. Some specifics that you can find on the website:

WIT Publications — This section of the website contains more than 130 individual titles divided into 13 categories: WIT Program Information, Design Plans, Inspection, Maintenance and Rehabilitation, Preservative Treatment, Monitoring and Performance, Materials, Contacts, Markets, Cost Information, General Information, Surfacing, and Financial Information. Publications can be ordered free-of-charge from the Information Center right from the website.

WIT Grants and Demonstration Projects — This page on the website offers details about the cost-share program. In the future, information on demonstration projects will be available.

In addition, the Forest Products Laboratory has a website that includes electronic versions of many of FPL's publications on wood-in-transportation technology. The website address is: *http://www.fpl.fs.fed.us/wit/.*

Responding to the need expressed by bridge engineers and government decisionmakers for up-to-date information on modern timber bridge construction, the USDA Forest Service prepared and published a design and construction manual, which can be acquired from the National Wood In Transportation Information Center by calling (304) 285-1591. Other publications offered by the Center include *Crossings*, the quarterly newsletter of the WIT Program; *Timber Bridge Superstructure Cost Report;* and *Contacts Report on Demonstration Project Cooperators*. Many publications developed by the Forest Products Laboratory, such as *Standard Plans for Southern Pine Bridges*, *Plans for Crash-Tested Bridge Railings for Longitudinal Wood Decks,* and a variety of monitoring reports are also available. In Fiscal Year 1997, about 65,000 pieces of wood-in-transportation information were distributed by the National Wood In Transportation Information Center.

Rural Revitalization

The WIT Program aims to stabilize and revitalize the economic well-being of rural economies through service industry development and market expansion. It strives to provide greater economic diversity and stability for rural communities. As part of the overall effort of the USDA Forest Service — State and Private Forestry's Economic Action Programs, WIT provides a tangible, efficient example of how local economies can be expanded and revitalized.

Typical activities include:

- **Emphasizing historically underutilized wood in the construction of wood-in-transportation structures,**

- **Creating local jobs and long-term employment prospects, and**
- **Creating additional service industries by utilizing community resources, i.e. local timber and local labor.**

WIT projects link local, regional, and national markets. They support business expansion while allowing commuters, travelers, producers, and shoppers to reach their destinations. Enhanced economic activity serves the public sector by generating additional revenue through sales, property, and income taxes. Wood-in-transportation structures can be a base for sustained economic growth by employing local labor to fabricate and erect bridges and related projects made from local timber.

Budget

Table 4 provides the funding history of the WIT Program by major program components.

Table 4. *Funding History of the Wood In Transportation Program, Fiscal Years 1989 through 1998.*

Goal	Combined 1989-1992 Final	1993 Final	1994 Final	1995 Final	1996 Final	1997 Final	1998 Final	1999 Planned
				Dollars in thousands...				
Demonstration Projects	$7,992	$1,005	$1,009	$1,020	$ 604	$ 447	$ 418	$250
Research	3,227	1,129	1,093	1,100	770	650	650	650
Technology Transfer	2,753	770	732	671	596	753	782	750
TOTAL	**$13,972**	**$2,904**	**$2,834**	**$2,791**	**$1,970**	**$1,850**	**$1,850**	**$1,650**

Administration of the WIT Program is assigned to the Northeastern Area, State and Private Forestry. Field locations are Morgantown, West Virginia (National Wood In Transportation Information Center), and selected Forest Service Regional Offices (Program Coordinators). The research component of the Program is administered at the Forest Products Laboratory in Madison, Wisconsin.

Key Contacts: Wood In Transportation Coordinators

Forest Service technical advisors are located throughout the country to help implement the WIT Program. Program Coordinators are responsible for:

- **Coordinating the demonstration WIT proposal process,**
- **Coordinating local conferences, workshops, and seminars,**
- **Providing technical assistance and disseminating information to potential users, and**
- **Providing information to the National Wood In Transportation Information Center.**

Listd below are the Forest Service Wood In Transportation Coordinators:

Name	States Served	Location	Telephone
Stephen Bratkovich	IA, IL, IN, MI, MN, MO, WI	St. Paul, MN	(612) 649-5246
Edward Cesa	DE, MD, NJ, OH, PA, WV	Morgantown, WV	(304) 285-1530
Chad Converse	AK	Anchorage, AK	(907) 271-2550
Robert Dettmann	CO, KS, NE, SD, WY	Lakewood, CO	(303) 275-5741
Dean Graham	N. ID, MT, ND	Missoula, MT	(406) 329-3521
Von Helmuth	CA, HI	San Francisco, CA	(415) 705-2678
Dean Huber	CT, MA, ME, NH, NY, RI, VT	Durham, NH	(603) 868-7689
Karen Kenna	AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA	Atlanta, GA	(404) 347-7206
Larry Roybal	AZ, NM	Albuquerque, NM	(505) 988-6932
Keith Schnare	S. ID, NV, UT	Ogden, UT	(801) 625-5260
William Von Segen	OR, WA	Portland, OR	(503) 326-7776

Wood In Transportation Conferences

Wood In Transportation information and technology has been made available to potential users at formal conferences. An estimated 14,000 state and county officials, engineers, and involved citizens have participated in these forums since the WIT Program's beginning. To date, more than 50 conferences and workshops have been held within the guidelines of the WIT Program, and more are tentatively scheduled.

Accomplishments of the Wood In Transportation Program

Table 5 on page 7 illustrates the expenditures for demonstration Wood In Transportation projects for Fiscal Years 1989 through 1998.

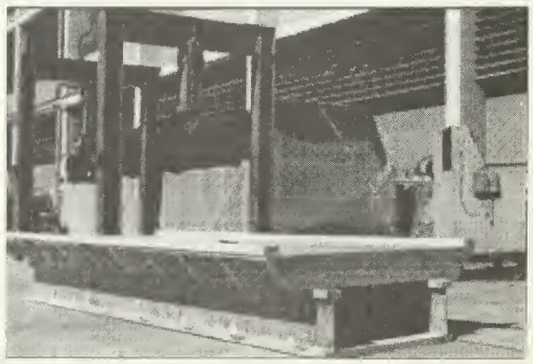
Table 5. Total Funding for *Demonstration Wood In Transportation Projects for Fiscal Years 1989 through 1998*.*

Goal	Combined 1989-1992 Final	1993 Final	1994 Final	1995 Final	1996 Final	1997 Final	1998 Final	Total
				...Dollars in thousands...				
Vehicular Bridge Projects:	(169)	(34)	(28)	(22)	(12)	(1)	(0)	(266)
Federal Contribution	$8,081	$1,088	$827	$683	$496	$50	$	$11,225
Cooperative Contribution	15,457	2,329	2,051	1,051	739	244	0	21,871
Subtotal	**$23,538**	**$3,417**	**$2,878**	**$1,734**	**$1,235**	**$294**	**$0**	**$33,096**
Pedestrian Bridge Projects	(13)	(13)	(8)	(9)	(7)	(5)	(1)	(56)
Federal Contribution	$130	$ 176	$ 73	$ 90	$ 64	$43	$14	590
Cooperative Contribution	206	719	423	263	122	135	14	1,882
Subtotal	**$336**	**$895**	**$496**	**$353**	**$186**	**$178**	**$28**	**$2,472**
Special Projects:	(17)	(14)	(18)	(17)	(13)	(8)	(3)	(90)
Federal Contribution	$345	$199	$380	$343	$393	$193	$73	$1,926
Cooperative Contribution	374	811	524	1,210	437	246	73	3,675
Subtotal	**$719**	**$1,010**	**$904**	**$1,553**	**$830**	**$439**	**$146**	**$5,601**
Commercialization Projects:	-	-	-	-	(1)	(3)	(3)	(7)
Federal Contribution	-	-	-	-	$105	$215	$286	$601
Cooperative Contribution	-	-	-	-	342	283	655	1,280
Subtotal	-	-	-	-	**$442**	**$498**	**$941**	**$1,881**
Total Dollars	**$24,593**	**$5,322**	**$4,278**	**$3,640**	**$2,693**	**$1,409**	**$1,115**	**$43,050**

* For Fiscal Years 1992 through 1997, total Forest Service demonstration project funding is greater than the total shown in Table 4. The difference in Table 5 reflects additional projects that were funded from returned grant dollars.

WIT in Action *continued . . .*

National Timber Bridge Design Competition



The National Timber Bridge Design Competition is a project partially funded by the Wood In Transportation Program. The student competition promotes the use of wood as a competitive bridge construction material, generates innovative and cost-effective timber bridge design techniques, and fosters an appreciation of the engineering capabilities of wood. The first competition was held in 1992. The event involves more than 100 students each year.

Bennie Hutchins, Southwest Mississippi Resource Conservation and Development, Inc., coordinator of the event, states, *"I have no doubt that the competition achieves its objectives, and I always receive positive feedback."* Mr. Hutchins selects three different judges each year, and he makes an effort to include individuals from private industry and academia as well as transportation officials. *"Even though it's hard to measure the impact the design competition has on those not involved with timber, I believe the engineering and transportation communities are becoming interested."*

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The table below illustrates the total federal funding, by state, for demonstration timber bridge projects since the beginning of the WIT Program. The table does not include bridges on National Forest System lands, special projects, or commercialization projects.

Table 6. *Total Federal Funding for Demonstration Vehicular and Pedestrian Timber Bridge Projects, Fiscal Years 1989 through 1998.*

State	FY 1989-97 Funding	FY 1989-97 # of Projects	FY 1998 Funding	FY 1998 # of Bridges	Total Funding	Total # of Bridges
Alabama	$ 561,099	13	$ 0	0	$ 561,099	16
Alaska	268,835	9	0	0	268,835	9
Arizona	155,950	6	0	0	155,950	6
Arkansas	212,850	7	0	0	212,850	7
California	105,500	5	0	0	105,500	5
Colorado	190,600	6	0	0	190,600	6
Connecticut	73,500	3	0	0	73,500	3
Delaware	0	0	0	0	0	0
District of Columbia	40,000	2	0	0	40,000	2
Florida	146,500	6	0	0	146,500	6
Georgia	297,590	12	0	0	297,590	12
Hawaii	0	0	0	0	0	0
Idaho	304,400	10	0	0	304,400	10
Illinois	186,500	6	0	0	186,500	6
Indiana	88,600	3	0	0	88,600	3
Iowa	165,700	6	0	0	165,700	6
Kansas	240,000	8	0	0	240,000	8
Kentucky	116,500	4	0	0	116,500	4
Louisiana	265,754	7	0	0	265,754	16
Maine	98,900	4	0	0	98,900	4
Maryland	304,250	9	0	0	304,250	10
Massachusetts	152,000	4	0	0	152,000	4
Michigan	600,875	19	0	0	600,875	20
Minnesota	149,000	3	0	0	149,000	3
Mississippi	300,873	11	0	0	300,873	11
Missouri	70,000	3	0	0	70,000	3
Montana	209,487	8	0	0	209,487	8
Nebraska	168,627	4	0	0	168,627	4
Nevada	30,000	1	0	0	30,000	1
New Hampshire	72,000	3	0	0	72,000	3
New Jersey	90,550	3	0	0	90,550	3
New Mexico	135,995	5	0	0	135,995	5
New York	504,281	18	0	0	504,281	18
North Carolina	25,000	1	0	0	25,000	1
North Dakota	141,700	5	0	0	141,700	5
Ohio	287,231	9	0	0	287,231	9
Oklahoma	240,862	9	0	0	240,862	9
Oregon	238,000	6	0	0	238,000	6
Pennsylvania	499,900	13	0	0	499,900	30
Rhode Island	68,555	4	0	0	68,555	4
South Carolina	61,000	3	0	0	61,000	3
South Dakota	119,100	4	0	0	119,100	5
Tennessee	170,160	8	0	0	170,160	8
Texas	39,400	2	0	0	39,400	2
Utah	87,270	5	0	0	87,270	5
Vermont	55,800	2	0	0	55,800	2
Virginia	130,000	6	0	0	130,000	6
Washington	157,500	6	0	0	157,500	6
West Virginia	2,860,686	21	14,250	1	2,874,936	64
Wisconsin	156,687	4	0	0	156,687	4
Wyoming	154,110	5	0	0	154,110	5
Total	$11,799,677	321	$14,250	1	$11,813,927	396

Table 7. *Total Federal Funding for Special Projects, Fiscal Years 1989 through 1998.*

State	FY 1989-97 Funding	FY 1989-97 # of Sp. Projects	FY 1998 Funding	FY 1998 # of Sp. Projects	Total Funding	Total # of Structures
Alabama	$18,400	1	0	0	$18,400	1
Alaska	49,910	1	0	0	49,910	1
Arizona	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0
California	0	0	0	0	0	0
Colorado	20,000	1	0	0	20,000	0
Connecticut	0	0	0	0	0	0
Delaware	0	0	0	0	0	0
District of Columbia	10,000	1	0	0	10,000	0
Florida	0	0	0	0	0	0
Georgia	20,000	1	0	0	20,000	7
Hawaii	0	0	0	0	0	0
Idaho	0	0	0	0	0	0
Illinois	0	0	0	0	0	0
Indiana	11,000	1	0	0	11,000	1
Iowa	67,500	3	0	0	67,500	1
Kansas	8,200	2	0	0	8,200	2
Kentucky	0	0	0	0	0	0
Louisiana	2,000	1	0	0	2,000	0
Maine	10,000	1	0	0	10,000	1
Maryland	11,500	1	0	0	11,500	1
Massachusetts	50,000	2	0	0	50,000	0
Michigan	19,300	2	0	0	19,300	0
Minnesota	0	0	0	0	0	0
Mississippi	128,000	12	0	0	128,000	0
Missouri	0	0	0	0	0	0
Montana	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0
Nevada	0	0	0	0	0	0
New Hampshire	12,500	1	0	0	12,500	0
New Jersey	30,000	1	0	0	30,000	0
New Mexico	18,886	1	0	0	18,886	0
New York	137,300	5	20,000	1	157,300	3
North Carolina	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0
Ohio	5,000	1	0	0	5,000	0
Oklahoma	0	0	0	0	0	0
Oregon	20,000	1	0	0	20,000	0
Pennsylvania	213,720	9	25,000	1	238,720	4
Rhode Island	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0
Texas	0	0	0	0	0	0
Utah	0	0	0	0	0	0
Vermont	30,000	1	0	0	30,000	1
Virginia	148,131	8	0	0	148,131	3
Washington	30,000	2	0	0	30,000	0
West Virginia	717,091	23	25,000	1	742,091	1
Wisconsin	65,000	4	0	0	65,000	2
Wyoming	0	0	0	0	0	0
Total	$1,853,438	87	$70,000	3	$1,923,438	29

The Wood In Transportation Outcomes

- ❒ More than 190 modern timber bridge projects completed. Many demonstrate the benefits of wood as a structural material.

- ❒ More than 50 special projects completed. Many demonstrate the use of timber in other wood-in-transportation applications, such as retaining walls, portable bridges for temporary access, and marine structures.

- ❒ Increased awareness among highway officials and bridge engineers about modern timber bridges.

- ❒ Developed informative, easy-to-understand timber bridge manual and related technical information.

- ❒ Comprehensive monitoring program implemented to determine the structural adequacy of new designs.

- ❒ Developed designs using underutilized timber.

- ❒ Certification of hardwood species for structural uses.

- ❒ Approximately 65,000 pieces of information distributed by the Center in fiscal year 1997.
  - ❖ Creation of a WIT website at *http://wit.fsl.wvnet.edu* and *http://www.fpl.fs.fed.us/wit/.*
  - ❖ Comprehensive library that includes over 130 publications.

- ❒ *"Crossings"* newsletter —5,200 distributed quarterly.

- ❒ Focused effort on commercializing developed technology.

The Wood In Transportation Outlook for Fiscal Year 1999

In the next year, the WIT Program will work toward the following:

- ❒ Continuing to commercialize existing technology that has been developed since fiscal year 1989.

- ❒ Continuation of research efforts that will further refine the performance and cost-competitiveness of transportation structures using locally-available timber resources.

- ❒ Increased information and educational efforts.
  - ❖ Improve and maintain the National Wood In Transportation Information Center's library.
  - ❖ Availability of technical information to the public through the INTERNET.

- ❒ Broadening timber bridge technology into other areas of transportation-related uses, such as rails-to-trails, docks and marine facilities, sign and light posts, portable timber bridges, culverts, sound barriers, retaining walls, and railings.

- ❒ Continued promotion of the WIT Program as an important tool in the stewardship of America's forests.

Selected Timber Bridge Information

The information provided below lists the potential advantages of wood for bridge replacement.

Wood type	Most tree species.
Amount of wood	15,000 board feet [32 ft. (W) by 30 ft. (L) span].
Maintenance	Low; no painting of treated timbers.
Chemical Effects	Wood is not affected by de-icing chemicals.
Life expectancy	30-50 years (see references).
Construction time	Minimal.
Use	All road systems — can be designed to carry all traffic loads.
Treatments	Basic wood preservative treatments are approved by the Environmental Protection Agency.

References

The following references provide additional information about modern timber bridges:

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Thickened Glue-Laminated Wood Panels on Steel Girders — Monroe County, West Virginia

Cooperative efforts of the USDA Forest Service, the West Virginia Division of Highways (WVDOH), and the Constructed Facilities Center (CFC) at West Virginia University have resulted in the rehabilitation of a highway bridge in Monroe County, West Virginia. The rehabilitation was extensive – new galvanized steel beams, repaired abutments, and a new glue-laminated wood deck were required to bring the Red Mill Bridge up to today's standards. Often, bridges with glue-laminated decks on steel beams suffer from cracked asphalt above each of the panel joints. This is known as reflective cracking. In order to minimize reflective cracking, the glue-laminated deck panels were designed and manufactured thicker than normal. The bridge was constructed with 8½-inch thick glue-laminated panels for half the deck and 10½-inch thick glue-laminated panels for the other half.

After two years of service, no cracks are visible at the joints above either the 8½- or 10½-inch panels.

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Cedar County, Iowa – Salt Storage Facility

This special project funded in fiscal year 1996 assisted in the design and construction of a salt storage facility in Cedar County, IA. The main project goal was to explore the potential market opportunity for using cottonwood lumber in the construction of salt storage facilities. The Limestone Bluffs Resource Conservation and Development (RC&D) Area and the Cedar County Engineering staff worked together with a private contractor to design and build the structure.

The Cedar County Engineer is very pleased with the facility. It offers many benefits to Cedar County and provides an example that other rural communities can follow. The benefits to Cedar County are: 1.) a building that enables the county to store 1,500 tons of sand and salt for use on county roads during the winter months, 2.) a local contractor erected the building on site, and 3.) a local business supplied the cottonwood lumber.

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Double-Diffusion Treatment Plant - Tyonek Native Corporation, Alaska

This special project funded in fiscal year 1995 assisted in the development of an innovative preservative treatment facility for local timber species in Alaska. The treatment plant uses a double-diffusion process for preserving local timber species. The double-diffusion process involves double-dipping green lumber in sodium fluoride and copper sulfate. The chemicals penetrate the wood and prevent decay.

Kevin Curtis, Manager of the Wood Products Division of Tyonek Corporation, says the plant is providing long-term employment for area residents. Located in the native village of Tyonek, the plant, according to Mr. Curtis, should make Alaska more self-sufficient by decreasing its reliance on imported timber. The plant uses white spruce, which is a locally available, under-utilized species.

Mr. Curtis also states that the plant supplies the lumber for other wood-in-transportation projects in the region. Two bridges are currently being designed and fabricated on Tyonek land, and a third one is being developed nearby. Because of these initiatives, access will be gained to additional Tyonek land and to other resources on the land. The plant, completed in June 1996, had a relatively low initial cost and is *"inexpensive and easy to operate,"* reports Mr. Curtis.